The invention relates to a television transmission method which is compatible with conventional television norms using a 4:3 picture aspect ratio as well as to a coder and to a decoder for this method. A transmission system of this type is described in DE 3840054.

For improved television transmission systems, it has already been established, on the grounds of public acceptance, that it will be necessary to increase the picture aspect ratio of television receivers from the hitherto 4:3 up to 16:9 (= the recommended picture aspect ratio of future HDTV standards) or 5:3, without losing compatibility with existing television norms (PAL, NTSC, SECAM). To this end, it is proposed in DE-C-3 840 054 to initially separate out each fourth line of the video signal at the transmitting end and to spatially compress the remaining lines or to interpolate them at the correct spatial location. The separated fourth lines are mixed, either directly or in scrambled form, into the spatial zones that have become free at the upper and lower edges of the picture. The resulting video signal is then transmitted in coded fashion. The original video signal is reconstructed with the picture aspect ratio of 16:9 or 5:3 from the received decoded video signal in that, after descrambling has occurred, the separated fourth lines that were mixed in at the upper and lower edges of the picture are inserted, with the correct line sequence, into the remaining spatially decompressed lines. For the reproduction of the received signal in a conventional 4:3 television receiver, the scrambled lines that were mixed in at the upper and lower edges of the picture are reproduced as quasi noise bars which, however, is something that may be found to be disturbing.

The object of the invention is to further develop a method of the type mentioned hereinabove such that for the reproduction in a conventional 4:3 television receiver, the upper and lower edges of the picture appear as a substantially uniform picture area.

This object is achieved by the features of claims 1 and 4. Advantageous developments of the invention are apparent from the appendant claims.

The further object of the invention is to provide a coder and a decoder for the method in accordance with the invention.

This object is achieved by the features of claims 13 to 18.

Embodiments of the invention will be explained hereinafter with the help of the drawings. These show in:

Fig. 1 a block circuit diagram of a first arrangement at the transmitting end for one embodiment of the television transmission system in accordance with the invention;

Fig. 2 a block circuit diagram of a first arrangement at the receiving end for the television transmission system in accordance with Fig. 1;

Fig. 3 the occupation of a conventional 8 MHz television channel by the two video signal bands and the sound carriers lying therebetween which were transmitted by the television transmission system in accordance with Figs. 1 and 2;

Fig. 4 a schematic illustration of the expansion at the transmitting end and the compression at the receiving end of the active regions of the separated television lines transmitted in the right hand video signal band-section of Fig. 3;

Fig. 5 a block circuit diagram of a second arrangement at the transmitting end for a second television transmission system in accordance with the invention;

Fig. 6 a block circuit diagram of a second arrangement at the receiving end for the television transmission system in accordance with Fig. 5;

Fig. 7 a schematic timing diagram for a visible and an invisible line in the television transmission system in accordance with Fig. 5.

In the block circuit diagram at the transmitting end in accordance with Fig. 1, a television picture source is referenced 10 and it is scanned by a raster corresponding to an enlarged picture aspect ratio of 16:9 (or 5:3). Apart from the altered picture aspect ratio, the video signal generated from the picture source 10 corresponds to a conventional standard in the illustrated example. In accordance with the PAL standard, each television picture comprises 575 active lines.

The output signal of the picture source 10, which is either an RGB signal or a YUV signal (these are indicated by the triple wires), is supplied to a video signal processing stage 151 which separates out one line from each group of four (or five) consecutive lines of the video signal and spatially compresses the remaining lines or interpolates them at the correct spatial location. The separated fourth lines are mixed into the spatial zones that have become free at the upper and lower edges of the

picture. The details of this video signal processing are given in DE 3840054. The output signal of the video signal processing stage 151 is coded in a subsequently connected coder 152 in accordance with the desired television norm e.g. PAL-norm. Instead of a PAL coding, it may, in advantageous manner, be coded in correspondence with the so-called I-PAL method (DE-C-3 338 192) in order to avoid cross-talk effects between brightness and colour signal components.

The active parts of the separated lines mixed in at the upper and lower edges of the picture are expanded in time up to the duration of a frame in order to thereby reduce their bandwidth. The signal resulting therefrom is, as Fig. 3 shows, transmitted within the conventional 8 MHz television channel in the free gap between the second sound carrier 36 and the upper end of the 8 MHz channel (Fig. 3, second band-section 32). The non-active parts (blanking region) of the separated lines as well as the totality of the remaining lines are transmitted with unchanged bandwidth in the normal carrier location below the first sound carrier 35 in the 8 MHz television channel (Fig. 3, first band-section 31). In a conventional 4:3 television receiver, the first band-section 31 lies within the IF pass-band curve while the second band-section 32 lies outside the IF pass-band curve and hence is suppressed by a conventional 4:3 television receiver. For the reproduction of the first band-section 31 in a conventional 4:3 television receiver, the non-active parts of the separated lines at the upper and lower edges of the picture only serve for the synchronisation whereby the missing active line regions are reproduced at the upper and lower edges of the picture as bars having continuous colouration e.g. black or grey.

The output signal of the coder 152 is supplied to a signal branching network 140 which is clocked by the synchronising signal of the studio (which also controls the picture source 10) at its control input 143. The alternate switching of the signal branching network 140 to the two outputs 141 and 142 occurs in such manner that the active parts of the separated lines mixed in at the upper and lower edges of the picture are transmitted to the first output 141. In accordance with DE 3840054, there are 2 x 72 separated lines per frame or 4 x 36 lines per two fields. The non-active parts or blanking regions of the 2 x 72 separated lines as well as the remaining lines are supplied in toto to the second output 142 of the signal branching network 140. This signal component is delayed in a first delay stage 172 by a delay time t which will explained subsequently and finally, is modulated in a first vision modulator 174 onto a first vision carrier 33 which corresponds to the normalised vision carrier.

The upper sideband of this modulation signal has a bandwidth of 5 MHz while the lower sideband comprises, in accordance with the norm, 0.75 MHz (Fig. 3, first band-section 31).

The signal at the first output 141 of the signal branching network 140 is scanned in a first scanning stage 161 at a first scanning frequency fs and written into a buffer store 162. For PAL signals, the quadruple value of the colour carrier frequency is usually selected as the scanning frequency fs. The buffer store 162 is read out at a second scanning frequency which is smaller than the first scanning frequency of the scanning stage 161 by the ratio

$$\frac{\text{number of the separated lines x duration of the active lines}}{\text{total number of the lines x line duration}}.$$

In the exemplary case being considered, the second scanning frequency for reading out the buffer store 162 which is produced by a second scanning stage 163 amounts to (144/625) x (52/64) x fs. In correspondence with the ratio of the first scanning frequency to the second scanning frequency, the expansion factor has the value 5.34. Accordingly, the expanded signal at the output of the second scanning stage 163 only has a bandwidth of 5 MHz/5.34 = 936 kHz. The expanded signal is modulated in a second vision modulator 164 onto a second vision carrier 34 which has a frequency separation of ca 6.7 MHz from the first vision carrier 33. The thus produced modulation signal lies within the 8 MHz television channel in accordance with Fig. 3, with its lower sideband below the second sound carrier 36 and with its residual sideband bordering on the channel boundary (Fig. 3, second band-section 32). As already mentioned, the second band-section 32 lies outside the IF pass-band curve of conventional 4:3 television receivers, which only pass the first band-section 31.

The television sound is likewise delayed in a second delay stage 11 by the delay time t and is modulated with its stereo components in a sound modulator 12 onto the two sound carriers 35 and 36 in accordance with Fig. 3. All of the modulation signals are combined into the transmitter signal as is indicated by the transmitting antenna 13 in Fig. 1.

The block circuit diagram in accordance with Fig. 2 shows the signal processing at the receiving end both for a conventional 4:3 television receiver (first vision demodulator 211, first PAL decoder 241 and first reproduction unit 251) as well as for a wide screen receiver having a picture aspect ratio of 16:9 (or 5:3). The transmitter signal received at the receiving antenna

20 is supplied in parallel to the first vision demodulator 211 and the second vision demodulator 212 whereby the first vision demodulator 211 demodulates the first vision carrier 33 having the first band-section 31 and the second vision demodulator 212 demodulates the second vision carrier 34 having the second band-section 32. The signal at the output of the second vision demodulator 212 has to be compressed in correspondence with the expansion at the transmitting end which is done by using a first scanning stage 221 for writing into a buffer store 22 and a second scanning stage 222 for reading out the buffer store 22. Thereby, the scanning frequency of the second scanning stage 222 is greater than the scanning frequency of the first scanning stage 221 by the ratio

$$\frac{\text{total number of the lines x line duration}}{\text{number of the separated lines x duration of the active lines}}.$$

The scanning frequency of the second scanning stage 222 preferably corresponds to the scanning frequency of the first scanning stage 161 at the transmitting end i.e. it corresponds to the value fs. The modulated signal at the output of the second vision demodulator 212 is thus compressed by the factor 5.34 and corresponds to the signal at the first output 141 of the signal branching network 140 at the transmitting end. Accordingly, the bandwidth of the compressed signal again amounts to 936 kHz x 5.34 = 5 MHz. This signal is mixed in the summing stage 23 to the demodulation signal (first band-section 31) at the output of the first vision demodulator 211 at the correct location in time so that the resulting signal, which is supplied to a second PAL decoder 242, corresponds to the output signal of the PAL coder 152 at the transmitting end. A video signal processing stage 25 is connected subsequent to the second PAL decoder 242 which corrects the re-ordering of the lines (1 out of 4 or 1 out of 5) that occurred in the video signal processing stage 151 at the transmitting end. The second reproduction unit 252 delivers a television picture having an enlarged picture aspect ratio of 16:9 (or 5:3) from the resulting video signal. What is fundamental here, is that the conventional 8 MHz channel is adequate both in the studio as well as on the transmission path for this picture transmission.

The television sound is obtained by means of a sound demodulator 213 and is supplied to one or more loudspeakers 26 of the 16:9 wide screen receiver or of the conventional 4:3 receiver. As already stated, this conventional television receiver reproduces the output signal of the vision demodulator 211 with bars at the upper and lower edges of the picture, which bars exhibit a uniform colouration e.g. black or grey. The disturbance effect

of such uniformly coloured bars is comparatively small and corresponds to the known reproduction of wide screen films in the television.

The expansion and compression in accordance with Figs. 1 and 2 will be explained in more detail hereinafter with the help of Fig. 4. The location in time of the separated 4 x 36 lines for two consecutive television fields is schematically plotted, whereby, the packets, each of 36 lines, are reproduced with the running line numbers at the beginning and end of the line packet i.e.

Lines 587 to 622,
Lines 24 to 59,
Lines 275 to 310 and
Lines 336 to 371.

In correspondence with the sequence of the method steps, there is illustrated at the top of Fig. 4, the location in time of the line packets at the first output 141 of the signal branching network 140 at the transmitting end, in the middle of Fig. 4, the location in time of the expanded line packets at the output of the second scanning stage 163 at the transmitting end or at the input of the first scanning stage 221 at the receiving end and, at the bottom of Fig. 4, the location in time of the line packets at the output of the second scanning stage 222 at the receiving end or the remaining signal at the output of the first vision demodulator 211 which is matched in time thereto by the delay by the time t (first delay stage 172). As one can perceive, in particular by the comparison of the upper with the middle illustration, the line packet of the lines 587 to 622 is stretched in time by the multiple 5.34, whereby the succeeding stretched line packet of the lines 24 to 59 is attached directly, without any gaps, to the end of the stretched line packet. The same applies for the gapless attachment of the stretched line packets 275 to 310 and 336 to 371.

During the compression at the receiving end, the line packets are put back into their original location in time but, with a time displacement which is made apparent in Fig. 4 by the delay time t. This time displacement t is caused by the manner of operation of the buffer stores 162 and 22. That is to say, the buffer store 162 can begin writing-in simultaneously with the beginning of the line 587 (time point t1) (vertical arrow from the upper illustration in Fig. 4 to the middle illustration) whilst the buffer store 22 at the receiving end can then have ended the read out at the soonest within a field only if the last stretched scanning value of the second line packet of the

lines 24 to 59 has been transmitted at the time point t2 (vertical arrow from the middle illustration to the lower illustration). The delay time t is thus calculated from the difference between the total number of the active lines of a field and the number of the separated lines of a field, in the example under consideration,
(288 - 72) lines = 216 lines, corresponding to ca 13.8 ms.
The signal at the second output 142 of the signal branching network 140 (it corresponds to the first band-section 31) is delayed by this delay time t in the first delay stage 172. The same applies for the sound in the second delay stage 11. As a result of the delay in the first delay stage 172, the signal at the output of the first vision modulator 211 is exactly at the correct time (lowest illustration of Fig. 4) relative to the output signal of the buffer store 22, this means, that the items of information of the two signals are correctly meshed at exactly the right time and can be combined.

The delay by the delay time t explained hereabove can, perceptually, be further explained in that the buffer store 162 at the transmitting end writes in discontinuously but reads out continuously and that the buffer store 22 at the receiving end writes in continuously but reads out discontinuously.

In the VHF band, in cable nets or in other television standards, the bandwidth of the channel may be limited to 7 MHz. In order to achieve the object of the invention there, a further embodiment will be exemplified.

To this end, altered items of information are inserted into the said e.g. 2 x 72 lines at the upper and lower edges of the picture. In order to make these item of information as invisible as possible for the viewer of a 4:3 standard television receiver, only a limited degree of modulation of the video signal and hence too, only a limited reduction of the signal-to-noise ratio is permissible. For this reason, it is not analogue parts of the separated lines themselves, but rather analogue difference signals of lines or digital items of supporting information that are transmitted to the receiver. In essence, with the help of these analogue difference signals or these digital supporting item of information, the separated lines (respectively one out of four or one out of five) are reconstructed again from the transmitted visible ones (respectively three out of four or respectively four out of five) in the receiver.

A television picture source, which is scanned with a raster corresponding to an enlarged picture aspect ratio of 16:9 (or

5:3), is referenced by 50 in the transmitting end block circuit diagram in accordance with Fig. 5. In the example illustrated, the video signals produced from the picture source 50 correspond to a conventional standard with the exception of the altered picture aspect ratio. In correspondence with the PAL standard, each television frame embraces 575 active lines.

The output signal of the picture source 50 is supplied to a video signal processing stage 551 which separates out one line from each group of four (or five) consecutive lines of the video signal and spatially compresses the remaining lines or interpolates them at the correct spatial location. The signals obtained from the separated fourth (or fifth) lines are mixed into the spatial zones at the upper and lower edges of the picture that have become free as already described above. The details of this video signal processing are given in DE 3840054. In contrast to DE 3840054 however, the separated lines are not transmitted directly but rather, as shown in the example in Table I, as analogue coded difference signals e.g. as difference values relating to lines that are adjacent in space or time, as well as, without a colour carrier. Due to this coding, the large degree of noise in the separated lines, which is caused by a reduced modulation, is distributed over three lines during the decoding in the receiver, as Table II depicts. Because of the correlation of the adjacent lines, the average degree of modulation is automatically reduced by the formation of the difference. In accordance with Fig. 7, the separated coded lines are transmitted below the black level of the video signal in the super black region, and thus invisiblly, at the upper and lower edges of the picture of the normal PAL receiver. In addition, in the separated lines, the back porch 71 can be displaced in the direction of the white level 72 whereby the level range between the black level 71 and the synchronising level 73 is corresponding enlarged.
The circuits 58 and 59 in the block circuit diagram are not used for the coding using analogue difference signals. The output signal of the video signal processing stage 551 is coded in a subsequently connected coder 552 in correspondence with the desired television norm e.g. the PAL norm. Instead of a PAL coding, there could, in advantageous manner, be a coding in correspondence with the so-called I-PAL method (DE-PS 3338192) in order to avoid cross-talk effects between brightness and colour signal components.

Table I

Line number	Line identification	interpolated 431 lines	separated 144 lines
1	A	$A = A'$	
2	B	$\frac{2}{3}B + \frac{1}{3}C = B'$	
3	C	$\frac{1}{3}C + \frac{2}{3}D = C'$	$\frac{1}{2}D - \frac{1}{2}C = X'$
4	D		
5	A	A	
¦	¦		¦
¦	¦		¦
¦	¦		¦
575			

The compatible 4:3 television receiver evaluates only the 431 interpolated lines in the 16:9 format. In the improved wide screen receiver, all 575 active lines are reconstructed in accordance with the following Table II.

Table II

Example of a line reconstruction in the 16:9 wide screen receiver

Line number	Reconstruction from the 431 lines and the 144 lines	Line identification
1	A	A
2	$\frac{3}{2}B' - \frac{1}{2}C' + \frac{2}{3}X'$	B
3	$C' - \frac{4}{3}X'$	C
4	$C' + \frac{2}{3}X'$	D
¦	¦	¦
¦	¦	¦
¦	¦	¦
575		

The coded video signal and sound signal are respectively delayed by ca 14 ms. These delay times correspond to the first 11 and second 172 delay stages from Fig. 1. Thereafter, the FM modulation of the sound occurs in the sound modulator 52 and the known residual sideband AM modulation of the video signal in the vision modulator 574.

For normal PAL reception using a conventional vision demodulator 611 and PAL decoder 641 at the receiving end, Fig. 6, the wide picture is reproduced on the 625 line screen 651 with the known black edges at the upper and lower edges of the picture. The video signal is demodulated in a vision demodulator 612 in the 16:9 (or 5:3) wide screen receiver and buffer stored in a buffer store 62. The circuits 69 and 68 are not used if analogue difference signals are coded and transmitted. The buffer stored video signals are decoded in the PAL decoder 642. The original 575 lines are regenerated again in the video signal processing

stage 65 and supplied to the 16:9 (or 5:3) picture screen 652. The television sound is demodulated in a sound demodulator 613 and reproduced by one or more loudspeakers 66.

In an alternative embodiment of the wide screen transmission, analogue coded difference signals are not transmitted but rather, there are transmitted digital items of supporting information, with which the original four (or five) lines can be reconstructed on each occasion in the 16:9 (or 5:3) wide screen receiver from the respectively three (or four) lines of the compatible reception. The transmitter block circuit diagram in Fig. 5 then additionally contains a supporting value processor 58, which calculates activity vectors for example, for the reconstruction of the respective missing lines at the receiving end. The corresponding output signals are coded in a digital supporting value coder 59 and transmitted in the lines at the upper and lower edge of the screen e.g. below the black value. The coding in the digital supporting value coder 59 is selected such that the main energy components lie in the middle of the video spectrum as for a dual binary code. A number of activity vectors per separated line may be simultaneously transmitted as the digital supporting function. This number is limited by the transmission capacity that is available.

For reducing the visibility of this digital modulation, the clock frequency is coupled to the line frequency and, moreover, the digital spectrum is placed in a less disturbing line and picture off-set position.

The decoding of the transmitted supporting values occurs in a digital supporting value decoder 69 in the corresponding receiver and the regeneration of the respective fourth (or fifth) lines of the wide picture that was separated in the transmitter occurs in a video signal processing circuit 68.

For a 16:9 picture format, one out of four lines is specially treated on each occasion and for a 5:3 format, one from five on each occasion.

The figures are altered for television systems using other numbers of lines. For a television system using 525 lines or 481 active lines, the edge strips may each contain 60 lines for example and the active region 361 lines.

Claims

1. A television transmission method compatible with conventional television norms using a 4:3 picture aspect ratio in which there is a scanning with a raster corresponding to an enlarged picture aspect ratio of 16:9 at the picture-source end (10, 50) and in which a first band-section (31) of the video signal is modulated (174) onto a first vision carrier (33), including the following method steps:
a) one line is separated out from each group of four consecutive lines of the video signal and the remaining lines are spatially compressed or interpolated at the correct spatial location;
b) the separated fourth lines are added into the spatial zones that have become free at the upper and lower edges of the picture (151, 551);
c) the resulting video signal is transmitted in coded fashion, and
d) the original video signal having the picture aspect ratio of 16:9 is reconstructed from the received, decoded video signal in that the separated lines that were added in at the upper and lower edges of the picture are inserted, with the correct line sequence, into the remaining, spatially decompressed lines (25, 65),

wherein, alternatively, the transmitted video signal can also be decoded by a conventional 4:3 receiver which reproduces the video signal demodulated from the first band-section (3) with bars at the upper and lower edges of the picture and wherein, for the transmission of the coded video signal, the following method steps are carried out at the transmitting end:
e) the active parts of the separated lines that were added in at the upper and lower edges of the picture are expanded in time up to the duration of a frame (161 to 163 and Fig. 4) and modulated (164) onto a second vision carrier (34) which is located at the upper end of the television channel in such a way that the resulting second band-section (32) lies substantially outside the IF pass-band curve of a conventional 4:3 receiver (211, 241, 251, 213, 26);
f) the non-active parts (blanking region) of the separated lines that were added in at the upper and lower edges of the picture as well as the remaining lines are modulated in toto onto the first vision carrier (33), in particular with a delay (τ in Fig. 4) corresponding to a signal transit time occurring during the decompressing (221, 22, 222), in such a way that the resulting first band-section (31) lies substantially within the IF pass-band curve of a conventional 4:3 receiver (211, 241, 251, 213, 26) and incorporates the standard signal for this receiver;

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g) both modulated vision carriers (33, 34) together with the one or the plurality of sound carrier (s) (35, 36) are combined into the transmitting signal (at 13),

and that, for the reconstruction of the original video signal from the received decoded video signal, the following method steps are carried out at the receiving end:
h) the second vision carrier (34) located at the upper end of the channel is demodulated and the video signal demodulated from the second band-section (32) is compressed in time in the output state in accordance with e);
i) the first vision carrier (33) is demodulated and the video signal demodulated from the first band-section (31) is added at the correct time to the video signal obtained from step h) (23, 242, 25) whereby the total signal resulting therefrom is decoded and reproduced (252) with the picture aspect ratio 16:9 in accordance with step d).

2. Method in accordance with Claim 1, characterised in that, for the implementation of the step e), the following partial steps are carried out:
- the active parts of the separated lines are separated from the incoming signal and read into a first buffer store (162) at a first scanning frequency (161), in particular at a multiple of four times that of the colour carrier frequency;
- the sample values stored in the first buffer store (162) are read out at a second scanning frequency (163) which is smaller relative to the first scanning frequency (161) by the ratio

$$\frac{\text{number of the separated lines x duration of the active lines}}{\text{total number of the lines x line duration}}.$$

3. Method in accordance with Claim 1 and 2, characterised in that, for the implementation of the step h), the following partial steps are carried out:
- the video signal demodulated from the second band-section (32) is read into a second buffer store (22) at a third scanning frequency (221) which, in particular, is equal to the second scanning frequency (163);
- the sample values stored in the second buffer store (22) are read out at a fourth scanning frequency (222), in particular at a multiple of four times that of the colour carrier frequency, which is greater relative to the third scanning frequency (221) by the ratio

$$\frac{\text{total number of the lines x line duration}}{\text{number of the separated lines x duration of the active lines}}.$$

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4. A television transmission method compatible with conventional television norms using a 4:3 picture aspect ratio in which there is a scanning with a raster corresponding to an enlarged picture aspect ratio of 16:9 at the picture source end (10, 50) and in which a first band-section (31) of the video signal is modulated (174) onto a first vision carrier (33), including the following method steps:
a) one line is separated out from each group of four consecutive lines of the video signal and the remaining lines are spatially compressed or interpolated at the correct spatial location;
b) the separated fourth lines are added into the spatial zones that have become free at the upper and lower edges of the picture (151, 551);
c) the resulting video signal is transmitted in coded fashion, and
d) the original video signal having the picture aspect ratio of 16:9 is reconstructed from the received, decoded video signal in that the separated lines that were added in at the upper and lower edges of the picture are inserted, with the correct line sequence, into the remaining, spatially decompressed lines (25, 65),

wherein, alternatively, the transmitted video signal can also be decoded by a conventional 4:3 receiver which reproduces the video signal demodulated from the first band-section (3) with bars at the upper and lower edges of the picture and wherein, the active parts of the separated lines within a level region between a black level (71) that is displaced in the direction of the white level and the synchronising pulse level (73) are transmitted at the upper and lower edges of the picture using analogue coding with a reduced degree of modulation, in particular, as difference signals between a respective separated line and lines that are adjacent in space or time.

5. Method in accordance with Claim 4, characterised in that, the back porch (71) is additionally displaced in the direction of the white level (72).

6. Method in accordance with Claim 4 or 5, characterised in that, the colour carrier is switched off in the lines at the upper and lower edges of the picture.

7. Method in accordance with Claim 4, characterised in that, an exclusively digital item of supporting information for the reconstruction of the separated lines from the visibly transmitted lines of the same and/or of the adjacent frame is transmitted in the free spatial zones at the upper and lower edges of the picture.

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8. Method in accordance with Claim 7, characterised in that, a number of activity vectors per separated line is transmitted as the digital supporting function.

9. Method in accordance with Claim 7 or 8, characterised in that, the activity vectors are transmitted digitally and that the digital coding (59) is selected such that the main energy components lie in the middle of the video spectrum as for a double binary code.

10. Method in accordance with Claim 7, 8 or 9, characterised in that, the clock rate of the digital item of supporting information is coupled to the line frequency.

11. Method in accordance with Claim 7 9 or 10, characterised in that, the clock frequency is displaced such that the spectral components of the digital item of supporting information are located in a line and picture offset position which is favourable in respect of the visibility of the digital modulation at the edges in the conventional 4:3 receiver.

12. Method in accordance with one or more of the Claims 4 to 11, characterised in that, one line is separated from each group of four or five consecutive lines.

13. Coder for a method in accordance with Claim 1 or 2 which is provided, with a video signal processing stage (151) for the separation and spatial compression or interpolation of lines, with a subsequently connected colour coder (152), in particular an I-PAL-M coder, with a device for the expansion in time (161, 162, 163) of the lines from the edges, with a subsequently connected second vision modulator (164) and with a first vision modulator (174) which is controlled in particular by a delay stage (172), wherein the output signals of the first and the second vision modulators are combined.

14. Decoder for a method in accordance with Claim 1 or 3 which is provided, with a first vision demodulator (211), with a second vision demodulator (212) which demodulates the lines from the edges and a subsequently connected device for time compressing (221, 22, 222) the lines from the edges, with a summing stage (23) for combining the output signals of the first vision demodulator and of the device for compressing in time, with a subsequently connected colour decoder (152), in particular an I-PAL-M decoder, and with a video signal processing stage (25) which arranges and/or interpolates the lines back into the original sequence.

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15. Coder for a method in accordance with one or more of the Claims 4 to 12 which is provided, with a video signal processing stage (551) for the separation of the lines at the edges of the picture and for the spatial interpolation of the remaining lines, with a subsequently connected colour coder (552), in particular an I-PAL-M coder, with a supporting value processor (58) which generates digital items of supporting information for the reconstruction of the original lines at the receiving end instead of the lines at the edges of the picture and to which a subsequent supporting value coder (59) is connected, with a vision modulator (574) to which the combined output signals of the supporting value coder and of the colour coder are supplied, in particular via a delay stage (572).

16. Decoder for a method in accordance with one or more of the Claims 4 to 12 which is provided with:
- a vision demodulator (642) whose output signals are supplied to a colour decoder (642), in particular an I-PAL-M decoder, and to a digital supporting value decoder (69) which decodes the digital items of supporting information arranged in the lines at the edges of the picture for the reconstruction of the original lines at the receiving end;
- a video signal processing circuit (68) connected after the supporting value decoder which regenerates the edge lines,
- a video signal processing stage (65) connected after the colour decoder which arranges the lines back into the original sequence with the help of the lines at the edges of the picture.

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